

Office Action Summary

Application No.

09/736,266

Applicant(s)

FELTZ ET AL.

Examiner

Gwendolyn A. Blackwell-Rudasill

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42, 45 and 46 is/are pending in the application.
- 4a) Of the above claim(s) 36-42 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35, 45 and 46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☒ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Information Disclosure Statement

1. The non-patent literature entitled "Ferroelectric Materials and Their Applications" has pages 120-123 missing from the relevant pages cited by applicant in Paper no. 13. Submission of those pages is necessary.

Oath/Declaration

2. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

Non-initialed and/or non-dated alterations have been made to the oath or declaration. See 37 CFR 1.52(c).

Applicant's remarks made in Paper no. 13 have been noted.

Election/Restrictions

3. Applicant's election with traverse of Group I in Paper No. 9 is acknowledged. If patentable subject matter lies with the article claims, rejoinder will be considered of the process claims in relation to those article claims.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claim 34 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 34 is indefinite due to the claim format. Because of the language and punctuation used in the claim, it is unclear exactly what applicant is claiming. Clarification is required to determine what is considered as the complete equation, the variables used, and what subscripts should go with each element.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

7. Claims 1 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent no. 5,233,260, Harada et al.

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Harada et al discloses a stack type piezoelectric element wherein plates of single or plural layers of a metallic material, such as copper or its alloys, are used as electrodes and interleaved with piezoelectric ceramic sheets, meeting the requirements of claim 1, (column 1, lines 40-65). The ceramic has a perovskite type structure, meeting the requirements of claim 13, (column 5, lines 40-43).

Claim 1 is a product by process claim wherein the patentability of the product does not depend on its method of production. "If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *See MPEP 2113*. As such, the process limitations within claim 1 does not provide patentable distinction over the prior art absent an evidentiary showing of unexpected results between the claimed invention and the prior art.

8. Claims 1-2, 13-14, 19, 21-22, and 45-46 are rejected under 35 U.S.C. 102(e) as being anticipated by United States Patent no. 6,266,230 B1, Kato et al.

Kato et al discloses a multilayer ceramic capacitor that is formed by laminating electrode metal layers, such as copper and/or copper alloy, between ceramic layers. The ceramic layer has a perovskite structure. In addition, the element on the A position of the perovskite (ABO_3), structure is Pb or Pb and at least one of the alkaline earth elements and at least one element selected from Nb, Ta, and W. At least one kind of element from the group including Mg, Zn, Ni, Co, Ti, Zr, and Sn is located on the B site, (columns 3-4, lines 58-33). Furthermore, a binder is used to in the formation of the green sheets, meeting the requirements of claims 1-2, 13-14, 19, 21-22, and 45-46, (column 8, lines 10-13).

Claim 1 is a product by process claim wherein the patentability of the product does not depend on its method of production. "If the product in the product by process claim is the same

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as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” See *MPEP 2113*. As such, the process limitations within claim 1 does not provide patentable distinction over the prior art absent an evidentiary showing of unexpected results between the claimed invention and the prior art. In particular, Kato et al disclose layering green sheets and electrode paste then sintering, (column 8, lines 17-31).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 1-2, 4-13, 15-19, 21, 23-33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent no. 6,266,230 B1, Kato et al., further in view of United States Patent no. 4,917,810, Tsunooka et al.

Kato et al disclose the limitations of claims 1, 13, 19 and 21 above. Kato et al do not disclose the density of the ceramic layers, the grain size of the grains in the ceramic layers, number of electrode layers, or the varying compositions of the perovskite structure as exemplified by applicant.

Tsunooka et al disclose a piezoelectric composite material that can be used where "high piezoelectric properties may be required such as sonic transducers, physical property measurements, ferroelectric, pyroelectric or piezoelectric keyboard switches and so on," (column 26, lines 42-50). The composite contains ceramic powders that are "mixed with a wider variety of polymers," and molded into a shape, (column 5, lines 10-14). The particle size of the ceramic material ranges between 1-400 μ , (column 5, lines 28-38). As disclosed in the examples, in particular Example 1, the components of the ceramic powder should be 98% or higher in purity, (column 9, Example 1). Tsunooka et al also disclose that many different types of ceramic compositions that can be used. The perovskite structures that can be used are listed in columns 6-67, lines 62-67). For example, solid solutions of lead titanate zirconate are made. Along with the lead titanate zirconate other cations can be present, on the A position, La, Na, K, or Bi can be present. On the B position, Nb, Ta, Mg, Ni, Co, Fe, Sc, or W can be present.

Kato et al and Tsunooka et al disclose analogous inventions. Kato et al teaches a multilayer ceramic capacitor that utilizes a piezoelectric perovskite composition. The perovskite composition can be lead titanate zirconate. Tsunooka et al discloses a piezoelectric perovskite composition that can be used in many electrical devices, where the composition of the ceramic can be lead titanate zirconate. As such, it would have been obvious to one skilled in the art at the time of invention to modify the ceramic capacitor of Kato et al with the ceramic composition of

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Tsunooka et al to manufacture an electrical device which is inexpensive to make, has thermal resistance and stable at high DC bias voltage, (Kato, column 3, lines 50-55).

Neither Kato et al nor Tsunooka et al specifically disclose the number of stacked layers as exemplified by applicant. However it is disclosed by Kato et al that green sheets of the ceramic should be alternately layered with metal electrodes, with the printing and lamination steps "repeated to obtain the required number of layers," (column 8, lines 17-31). Based upon the aforesaid information, it is within the ability of one skilled in the art at the time of invention through routine experimentation to optimize the number of layers that should be present in the electrical device.

12. Claims 1-3, 13, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent no. 6,266,230 B1, Kato et al., further in view of United States Patent no. 4,128,489, Seo.

Kato et al disclose the limitations of claims 1-2 and 13 above. Kato et al do not disclose that the polymer is a polyurethane or the specific composition of PZT.

Seo discloses a piezoelectric material that utilizes a urethane rubber in the polymer binder mix, (column 2, lines 35-36). Further examples of the specific polymer that can be used are listed in Table 9, column 9. In addition, Example 7, set out that the formula of PZT satisfies the equation $\text{Pb}(\text{Zr}_2\text{Ti}_{1-x})\text{O}_3$, (column 8, lines 4-5).

Kato et al and Seo disclose analogous inventions. Kato et al teaches a multilayer ceramic capacitor that utilizes a piezoelectric perovskite composition. The perovskite composition can be lead titanate zirconate. Seo discloses a piezoelectric perovskite composition that can be used in many electrical devices, (column 2, lines 1-3), where the composition of the ceramic can be lead titanate zirconate. As such it would have been obvious to one skilled in the art at the time of

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invention to modify the device of Kato et al with the lead titanate zirconate composition of Seo to produce an electrical device having high piezoelectric modulus and reduced anisotropy of piezoelectric modulus, (Seo, column 1, lines 43-50).

Response to Arguments

13. Applicant's arguments filed July 22, 2003 have been fully considered but they are not persuasive.

Applicant sets forth several arguments regarding the claimed subject matter being distinct from the prior art. The first argument is that invention of United States Patent no. 5,233,260, Harada et al is not the same as the invention of the present application because of different processing steps. Harada et al disclose that structure with the components as exemplified by applicant. As such, the product of claims 1 and 13 are not distinct from the prior art absent an evidentiary showing to the contrary that process steps provide patentable distinction over the prior art.

Applicant also contends that United States Patent no. 6,266,230, Kato et al disclose that an inner electrode material can only be used at temperature below 1150°C, (column 12, 39-41). This only relates to the one example. Kato et al disclose that "the electrode metal is selected depending on the temperature at which a dielectric is sintered and atmosphere conditions," (column 1, lines 54-56). Kato et al also disclose that the material used is copper or a copper alloy, (column 4, lines 27-33). Polyvinyl butyral (PVB) is used to demonstrate that it is known to add a binder to the ceramic green foils. Kato et al do not disclose anything about the atmosphere or the fact that using copper will result in oxidized copper. One example as demonstrated by Kato et al with the use of PVB does not necessarily mean that PVB will be used

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with copper. In addition, applicant has indicated that copper can remain stable under conditions around 1000°C under a low oxygen partial pressure, (specification, page 5, lines 15-16). Absent evidence to the contrary that the invention set forth by Kato et al would not provide the structure as exemplified by applicant, the product claims 1-2, 4-13, 15-19, 21, 23-33, and 35 are not distinct from the prior art. Furthermore, Kato et al disclose layering then sintering the green sheets and electrode material together, (column 8, lines 17-31).

Applicant further contend that the obviousness rejections are moot because Kato et al is not relevant and the secondary references do not make up the missing teaching of Kato et al. Because the arguments against the use of Kato et al are not persuasive, the obviousness rejections will also stand.

While Applicant contends that the prior art of record to not teach or disclose the method steps as exemplified in the newly amended product by process claim 1, Kato et al do teach examples that use that type of method in order to manufacture the piezoelectric device. As such, the addition of process steps to claim does not render the claim patentably distinct over the prior art. The additional cited reference to United States Patent no. 6,236,146 is used to further demonstrate that this type of method is commonly used in the art.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

United States Patent no. 6,236,146, disclose a piezoelectric actuator that utilizes copper as the electrode material wherein the electrode material is located between two green sheets with the entire structure sintered after forming.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gwendolyn A. Blackwell-Rudasill whose telephone number is (703) 305-9741. The examiner can normally be reached on Monday - Thursday; 6:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on (703) 308-3822. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

GBR
gbr
September 8, 2003

Gwendolyn A. Blackwell-Rudasill
Examiner
Art Unit 1775


DEBORAH JONES
SUPERVISORY PATENT EXAMINER